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# State Use of Workforce System Net Impact Estimates and Rates of Return

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## ABSTRACT

The net impacts and private and social benefits and costs of workforce development programs were estimated in three separate studies; two of them in Washington and one in Virginia. The programs included the public job training system, programs at community and technical colleges, adult basic education, private career schools, high school career and technical education, and vocational rehabilitation for disabled individuals and for blind or visually impaired individuals.

The net impact analyses were conducted using a nonexperimental methodology. Individuals who had encountered the workforce development programs were statistically matched to individuals who had not. Administrative data with information from the universe of program participants and Labor Exchange data for registrants (who served as the comparison group pool) were used for the analyses. These data included several years of pre-program and outcome information including demographics, employment and earnings information from the Unemployment Insurance wage record system, and transfer income information such as Food Stamps and Temporary Assistance for Needy Families (TANF) recipiency and benefits.

This paper presents the results from the studies and extends them in three directions. First, it compares and contrasts the results across the three studies. Second, it decomposes the net impacts into employment, wage, and hours impacts. Third, it displays rates of return for individuals served by the programs, for state taxpayers, and for society as a whole. In general, we find positive net impacts and returns on investment for virtually all of the programs.

The policy implications of this work are several in number. First, the studies add to the inventory of work that demonstrates that useful evaluations of workforce development education and training programs can be done with administrative data. Second, the decomposition of net earnings impacts into employment, hours, and wage rates adds rich understanding to the variation in these impacts across programs. The rate of return analyses demonstrate that the public (i.e., taxpayers) and society as a whole can benefit financially from education and training investments, although the payoffs generally take more than 10 quarters to offset the costs.

Finally, the results for individuals programs are illuminating. The estimates presented here suggest that apprenticeships, community college job preparatory training, and vocational rehabilitation programs have quite substantial financial payoffs for participants. On the other hand, adult basic education programs tend not to provide much of an economic return to participants or the public. The Workforce Investment Act (WIA) services for adults seem to have a significant positive impact on employment, wage rates, and earnings. Not surprisingly, the analyses point out the large foregone earnings of dislocated workers that dampen their financial payoff to training. Policy makers may wish to consider stronger support mechanisms for these workers such as stipends during training. Finally, the analyses presented here also buttress strongly the research that has shown significant economic returns to career and technical education in the high schools.

## INTRODUCTION

This paper contrasts and compares the net impacts of multiple workforce development programs estimated in three independent studies done in two states. These estimates were computed using a quasi-experimental methodology in which individuals who had been served by the workforce system in the state were statistically matched to individuals who had encountered the Employment Service. The impetus for these studies was a commitment on the part of the legislatures of both states to accountability and data-driven performance monitoring and management.

In two of the studies from which the net impacts that are reported here emanate, rates of return have been calculated for the workforce development programs that include a full accounting of the opportunity costs of participants' training investments, tax liabilities incurred due to increased earnings, as well as changes in earnings-conditioned transfers such as unemployment compensation, TANF benefits, food stamps, and Medicaid. Furthermore these two studies estimate the net impacts on earnings as well as the components of earnings: employment, hours, and wage rates.

The contributions of this paper are threefold: 1) to compare and contrast the net impacts on employment and earnings across the three independent studies; 2) to show the decomposition of the net impacts into employment rates, hours, and wage rates; and 3) to present rates of return to individuals, states, and society.

## PROGRAMS, OUTCOMES, AND TIME PERIODS

This paper draws from three studies. Each study examined a slightly different set of workforce development programs covering different time periods. Table 1 displays the various

programs and time periods. The first two studies, done in Washington, focused on approximately the same programs: federal job training for adults, dislocated workers, and youth; a state-supported program for dislocated workers; apprenticeships; and four types of educational programs: adult basic education, high school career and technical education, community college job prep, and private career schools. In the second study in Washington, rehabilitative services programs were added to the scope of work. The programs analyzed for the study done in Virginia overlapped these programs somewhat: they included the federal job training programs for adults, dislocated workers, and youth; community college career and technical education; adult education; and rehabilitative services. In addition, this study included trade adjustment assistance, welfare-to-work, and Food Stamps Employment and Training (FSET).

As noted in table 1, the time periods in which the participants were in the programs varied across the studies. The studies defined participation year by when the individual exited from the program. All of the studies used the entire universe of program exiters: in 1997/98 and 1999/2000 for the first Washington study; in 2001/02 and 2003/04 for the second Washington study; and 2004/05 for the Virginia study. To be clear, someone who participated in a program for three years and who exited sometime during 1997/98 is considered to be a 1997/98 participant, as is someone who both entered and exited in 1997/98.[1]

[1] In program evaluation, populations of participants are often defined by entry date or as a cross-section of current enrollees. It is well-known that current enrollees are not representative of the population of all individuals who participate in a program because individuals with longer durations are more likely to be a current participant. The alternative of selecting all individuals who entered a program at a particular period of time captures the population of all individuals who participate in the program. The problem with using entry cohorts is that if programs last a long period of time (e.g., Community and Technical College Job Preparatory programs or Apprenticeships), it will take several years to get outcome data. The approach used in this study of defining the population by exit date is also representative of all individuals participating in the program, but allows a substantial number of quarters for outcome data. The "downside" to this approach is that the "treatment" received may differ for individuals in the same program simply because they started at different times and had different durations of participation.

**Table 1**

**Programs Analyzed and Year of Participation,[a] by Study**

| | Study 1 Exit Year | | Study 2 Exit Year | | Study 3 Exit Year |
|---|---|---|---|---|---|
| | 1997/1998 | 1999/2000 | 2001/2002 | 2003/2004 | 2004/2005 |
| Federal Job Training (Adults) | | | | | |
| JTPA II-A | X | X | | | |
| WIA I-B | | | X | X | X[b] |
| Federal Job Training (Youth) | | | | | |
| JTPA II-C | X | X | | | |
| WIA I-B Youth | | | X | X | X |
| Dislocated Workers | | | | | |
| JTPA III | X | X | | | |
| WIA I-B | | | X | X | X |
| Comm. and Tech. College Worker Retraining | X | X | X | X | |
| Secondary Career and Tech Ed. | X | X | X | X | |
| Community College Job Prep | X | X | X | X | X |
| Private Career Schools | | X | X | X | |
| Adult Ed./Literacy | X[c] | X[c] | X[c] | X[c] | X |
| Rehabilitative Services | | | | | |
| Vocational Rehabilitation | | | X | X | X |
| Blind and Visually Impaired | | | X | X | X |
| Apprenticeships | X | X | X | X | |
| Welfare-to-Work | | | | | |
| TANF | | | | | X |
| FSET | | | | | X |
| Trade Adjustment Assistance | | | | | X |

**NOTE:** Study 1 is Hollenbeck and Huang 2003 (Washington State); Study 2 is Hollenbeck and Huang 2006 (Washington State); Study 3 is Hollenbeck and Huang 2008 (Virginia).
[a]Year of participation defined as year of exit from services.
[b]Combined in this study.
[c]Adult basic education as delivered by community and technical colleges only.

In all three studies, the net impacts of participation in the workforce development programs on employment and earnings were estimated. The data came from the quarterly wage record data generated from the Unemployment Insurance (UI) system, and thus are measured over a calendar quarter. In Washington, the wage record data include hours worked in a quarter, so for the studies undertaken for that state, we estimated the net impacts on hours worked per

quarter and hourly wages. Virginia had an interest in the extent to which participants earned credentials either during program participation or within a year of exit, so that outcome was analyzed in the Virginia study.[2]

The Washington studies also examined the net impact of program participation on the receipt of unemployment compensation benefits, public assistance benefits (TANF and Food Stamps), and Medicaid enrollment. These data were supplied by the state agencies that administer those programs. Table 2 summarizes the outcomes that were examined in the studies.

As table 2 notes, all of the studies focused on two outcome time periods: a short-term outcome and a longer-term outcome. In Washington, these were three full quarters after exit and 8-11 full quarters after exit in the first study (9-12 full quarters in the second study). In Virginia, these were two and four full quarters after exit, respectively.

[2]The Virginia study also used the wage record data to develop an outcome variable that was used to measure employer satisfaction.

**Table 2**

**Outcomes Examined and Time Periods, by Study**

| Outcomes | Study 1 and Study 2 | Study 3 |
|---|---|---|
| Employment | Defined as ≥ $100 in a quarter | Defined as ≥ $50 in a quarter or enrolled in school if ≤ 18 |
| Earnings | Quarterly earnings totaled across all employers | Quarterly earnings totaled across all employers |
| Hours Worked per Quarter | Hours totaled across all employers | Not available |
| Hourly wages | Earnings divided by hours worked | Not available |
| Credential completion | Not available | Credential earned while in program or within 12 months of exit |
| Unemployment compensation | Benefits of at least $1 in quarter | Not available |
| TANF/Food Stamp benefits | Benefits received by assistance unit that included participant of at least $1 in quarter | Not available |
| Medicaid eligibility | State Medicaid administrative data indicated participant was "enrollee" during at least one day in quarter | Not available |
| Time Periods: | 3 full quarters after exit | |
| Short term | 8–11 full quarters after exit in study 1; 9—12 full quarters after exit in study 2 | 2 full quarters after exit |
| Long term | | 4 full quarters after exit |

**NOTE:** Study 1 is Hollenbeck and Huang 2003 (Washington State); Study 2 is Hollenbeck and Huang 2006 (Washington State); Study 3 is Hollenbeck and Huang 2008 (Virginia).
[a]Year of participation defined as year of exit from services.
[b]Combined in this study.
[c]Adult basic education as delivered by community and technical colleges only.

## METHODOLOGY AND ESTIMATION STRATEGY

The net impact evaluation problem may be stated as follows: Individual $i$, who has characteristics $X_{it}$, at time $t$, will be observed to have outcome(s) $Y_{it}(1)$ if he or she receives a "treatment," such as participating in the workforce development system and will be observed to have outcome(s) $Y_{it}(0)$ if he or she doesn't participate. The net impact of the treatment for individual $i$ is $Y_{it}(1) - Y_{it}(0)$. But of course, this difference is never observed because an individual cannot simultaneously receive and not receive the treatment.

The time subscript is dropped in the following discussion to simplify the notation without loss of generality. Let $W_i = 1$ if individual $i$ receives the treatment, and $W_i = 0$ if $i$ does not

receive the treatment. Let $T$ represent the data set with observations about individuals who receive the treatment for whom we have data, and let $n_T$ represent the number of individuals with data in $T$. Let $U$ represent the data set with observations about individuals who may be similar to individuals who received the treatment for whom we have data, and let $n_U$ be its sample size. Let $C$ be a subset of $U$ that contains observations that "match" those in $T$, and let $n_C$ be its sample size. Names that may be used for these three data sets are Treatment sample ($T$), Comparison sample universe ($U$), and Matched Comparison sample ($C$).

Receiving the treatment is assumed to be a random event—individuals happened to be in the right place at the right time to learn about the program, or the individuals may have experienced randomly the eligibility criteria for the program—so $W_i$ is a stochastic outcome that can be represented as follows:

(1) $W_i = g(X_i, e_i)$, where

$e_i$ is a random variable that includes unobserved or unobservable characteristics about individual $i$ as well as a purely random component.

An assumption made about $g(\bullet)$ is that $0 < \text{prob}(W_i = 1|X_i) < 1$. This is referred to as the "support" or "overlap" condition, and is necessary so that the outcome functions described below are defined for all $X$.[3]

In general, outcomes are also assumed to be stochastically generated. As individuals in the treatment group encounter the treatment, they gain certain skills and knowledge and encounter certain networks of individuals. Outcomes are assumed to be generated by the following mapping:

(2) $Y_i(1) = f_1(X_i) + e_{1i}$

[3] Note that Imbens (2004) shows that this condition can be slightly weakened to $\Pr(W_i = 1|X_i) < 1$.

Individuals not in the treatment group progress through time and also achieve certain outcomes according to another stochastic process, as follows:

(3) $Y_i(0) = f_0(X_i) + e_{0i}$

Let $f_k(X_i) = E(Y_i(k)|X_i)$, so $e_{ki}$ are deviations from expected values that reflect unobserved or unobservable characteristics, for $k = 0,1$.

As mentioned, the problem is that $Y_i(1)$ and $Y_i(0)$ are never observed simultaneously. What is observed is the following:

(4) $Y_i = (1 - W_i)Y_i(0) + W_iY_i(1)$

The expected value for the net impact of the treatment on the sample of individuals treated:

(5) $E[Y_i(1) - Y_i(0)|X, W_i = 1] = E(\Delta Y \mid X, W = 1)$

$= E[Y(1)|X, W = 1] - E[Y(0)|X, W = 0] + E[Y(0)|X, W = 0] - E[Y(0)|X, W = 1]$

$= \hat{f}_1(X) - \hat{f}_0(X) + \text{BIAS},$ where

$\hat{f}_k(X)$, $k = 1, 0$, are the outcome means for the treatment and comparison group samples, respectively, and

BIAS represents the expected difference in the $Y(0)$ outcome between the comparison group (actually observed) and the treatment group (the counterfactual.)

The BIAS term may be called selection bias.

A key assumption that allows estimation of equation (5) is that $Y(0) \perp W|X$. This orthogonality assumption states that given $X$, the outcome (absent the treatment), $Y(0)$, is random whether or not the individual is a participant. This is equivalent to the assumption that participation in the treatment can be explained by $X$ up to a random error term. The assumption is called "unconfoundedness," "conditional independence," or "selection on observables." If the assumption holds, then the net impact is identified because BIAS goes to 0, or

(6) $E[\Delta Y|X, W = 1] = \hat{f}_1(X) - \hat{f}_0(X)$

In random assignment, the $X$ and $W$ are uncorrelated through experimental control, so the conditional independence assumption holds by design. In any other design, the conditional independence is an empirical question. Whether or not the data come from a random assignment experiment, however, because the orthogonality assumption holds only asymptotically (or for very large samples), in practice, it makes sense to regression-adjust equation (6).

Various estimation techniques have been suggested in the literature, but they may be boiled down to two possibilities: 1) use all of the $U$ set or 2) try to find observations in $U$ that closely match observations in $T$. Note that identification of the treatment effect requires that none of the covariates $X$ in the data sets are perfectly correlated with being in $T$ or $U$. That is, given any observation $X_i$, the probability of being in $T$ or in $U$ is between 0 and 1. Techniques that use all of $U$ are called full sample techniques.[4] Techniques that try to find matching observations will be called matching techniques. The studies reported here used the latter, although Hollenbeck (2004) tests the robustness of net impact estimates to a number of matching techniques.

The studies that are discussed here use a nearest-neighbor algorithm using propensity scores as the distance metric (see Dehejia and Wahba 1995). Treatment observations are matched to observations in the comparison sample universe with the closest propensity scores. The matching is done with replacement and on a one-to-one basis. Matching with replacement reduces the "distance" between the treatment and comparison group cases, but it may result in the use of multiple repetitions of observations, which may artificially dampen the standard error

[4] Some of these techniques trim or delete a few outlier observations from $U$ but will still be referred to as full sample techniques.

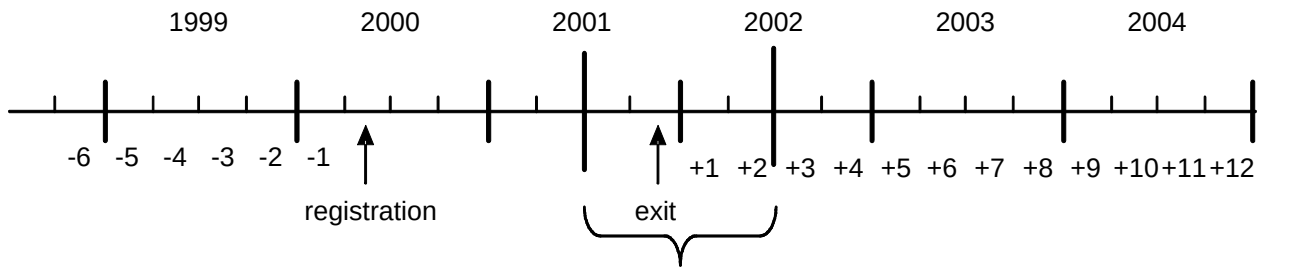
of the net impact estimator. Finally, a caliper is employed to ensure that the distance between the observations that are paired be less than some criterion distance.

For most of the programs analyzed (and identified in table 1), we used the public labor exchange data (known as Job Service, Employment Service, or Wagner-Peyser data) as the Matched Sample universe (i.e., set *U*). This is tantamount to the assumption that were these workforce development programs unavailable, then the individuals who were served would have gone to the public labor exchange for services. For some of the programs, the public labor exchange was not an appropriate counterfactual and alternative administrative data sources were used. These programs included secondary career and technical education, vocational rehabilitation, and blind and visually impaired services. For high school career and technical education, the matched comparison universe was all high school graduates in the state. For the other two programs, the matched comparison universe was composed of non-served applicants.

The net impacts for the outcomes listed in tables were estimated by regression-adjusting levels or difference-in-differences. We generally relied on the difference-in-difference estimators except where stark changes in labor market experiences were likely to have occurred—for youth and for dislocated workers. The base period for difference-in-difference estimators was for quarters −6 to −3 before program registration. The timeline in Figure 1 is intended to help explain the analyses periods. The timeline shows the registration and exit dates for a hypothetical individual of adult age who registered for WIA Title I-B in April, 2000 (Quarter 2 of 2000) and exited from services in November, 2001(Quarter 4 of 2001). The earnings profile shows that this person had average quarterly earnings of $2,500 (real) in the base period (1998:Q4 to 1999:Q3), $2,700 in the 3rd quarter after exit (2002:Q3); and $3,100 average quarterly earnings in the 9th–12th post-exit quarters, which were 2004:Q1 to 2004:Q4.

So in the regression adjustment of earnings levels, the dependent variables would have been $2,700 and $3,100 for the short-term and longer-term outcomes. In the regression adjustment of difference-in-differences, the dependent variables would have been $200 and $600, respectively.

**Figure 1 Timeline and Earnings Profile for a Hypothetical WIA Title I-B Adult Client**




| Earnings Profile | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Calendar Quarter | 98:Q1 | 98:Q2 | 98:Q3 | 98:Q4 | 99:Q1 | 99:Q2 | 99:Q3 | 99:Q4 | 00:Q1 | 00:Q2 | 00:Q3 | 00:Q4 |
| Analysis Quarter | –9 | –8 | –7 | –6 | –5 | –4 | –3 | –2 | –1 | Training | → | |
| Real Earnings | $2,300 | $1,500 | $0 | $1,000 | $2,800 | $3,000 | $3,200 | $3,200 | $1,600 | $0 | $0 | $1,200 |
| Calendar Quarter | 01:Q1 | 01:Q2 | 01:Q3 | 01:Q4 | 02:Q1 | 02:Q2 | 02:Q3 | 02:Q4 | 03:Q1 | 03:Q2 | 03:Q3 | 03:Q4 |
| Analysis Quarter | Training | → | | | +1 | +2 | +3 | +4 | +5 | +6 | +7 | +8 |
| Real Earnings | $2,000 | $0 | $0 | $1,500 | $2,500 | $2,700 | $2,700 | $2,700 | $2,900 | $0 | $1,600 | $2,900 |
| Calendar Quarter | 04:Q1 | 04:Q2 | 04:Q3 | 04:Q4 | | | | | | | | |
| Analysis Quarter | +9 | +10 | +11 | +12 | | | | | | | | |
| Real Earnings | $3,000 | $3,100 | $3,100 | $3,200 | | | | | | | | |

| Outcome Variables | |
|---|---|
| Earnings (+3) | $2,700 |
| Ave. Earnings (9–12) | $3,100 |
| Base Period Earnings (–6 through –3) | $2,500 |

## SUMMARY OF RESULTS

Table 3 provides a summary of the short-term net impacts of the programs on employment rates, quarterly hours of employment, average wage rates, and quarterly average earnings. All of the results in the table for studies 1 and 2 are regression-adjusted, and all of the

## Table 3

### Short-Term Net Impact Estimates

| Program | Study | Outcome: Employment Rate | Quarterly Hours | Wage Rate[d] | Quarterly Earnings[d] |
|---|---|---|---|---|---|
| Federal Job Training (Adults) | | | | | |
| JTPA II-A | 1 | 0.109*** | 18.6* | $0.77 | $349*** |
| WIA I-B | 2 | 0.097*** | 52.2*** | $1.49*** | $711*** |
| WIA I-B | 3[a] | 0.034*** | — | — | $146*** |
| Federal Job Training (Youth) | | | | | |
| JTPA II-C | 1 | 0.061*** | −15.3 | −$0.31 | −$304*** |
| WIA I-B Youth | 2 | 0.042** | 4.7 | $0.20 | $66 |
| WIA I-B Youth | 3[a] | −0.039** | — | — | $62 |
| Dislocated Workers | | | | | |
| JTPA III | 1 | 0.075*** | 19.6*** | −$0.55 | $278*** |
| WIA I-B | 2 | 0.087*** | 58.4*** | $1.04*** | $784*** |
| Worker Retraining[b] | 1 | 0.054*** | 18.9*** | −$1.19 | $65 |
| Worker Retraining[b] | 2 | 0.056*** | 30.7*** | $0.09 | $243*** |
| Education | | | | | |
| Secondary CTE | 1 | 0.059*** | 23.5*** | $0.80*** | $273*** |
| Secondary CTE | 2 | 0.068*** | 27.8*** | $0.67*** | $274*** |
| Comm. College Job Prep | 1 | 0.045*** | 38.6*** | $2.22*** | $1,107*** |
| Comm. College Job Prep | 2 | 0.103*** | 51.8*** | $2.34*** | $1,275*** |
| Comm. College Job Prep | 3[a] | 0.028*** | — | — | $1,539*** |
| Private Career Schools | 2 | 0.054*** | 27.6*** | $0.95*** | $460*** |
| Adult Basic Ed.[c] | 1 | 0.020*** | −4.5 | $0.37 | $91 |
| Adult Basic Ed.[c] | 2 | 0.021*** | 9.9*** | $0.10 | $7 |
| Adult Educ./Literacy | 3[a] | −0.091*** | — | — | −$21 |
| Apprenticeships | 1 | 0.025* | 5.9 | $6.22*** | $1,950*** |
| | 2 | 0.065*** | 14.5** | $5.98*** | $2,510*** |
| Disability Services | | | | | |
| Vocational Rehabilitation | 2 | 0.196*** | 59.5*** | $2.41*** | $881*** |
| Vocational Rehabilitation | 3[a] | 0.162*** | — | — | $241*** |
| Blind and Visually Impaired | 2 | 0.305*** | 104.2*** | $6.53*** | $2,686*** |
| Blind and Visually Impaired | 3[a] | 0.250*** | — | — | $1,318*** |

**NOTES:** Study 1 is Hollenbeck and Huang 2003 (Washington State); Study 2 is Hollenbeck and Huang 2006 (Washington State); Study 3 is Hollenbeck and Huang 2008 (Virginia).
*** represents statistical significance at the 0.01 level; ** represents statistical significance at the 0.05 level; * represents statistical significance at the 0.10 level.
[a] Virginia wage record data do not include hours so no results are possible for quarterly hours or wage rate.
[b] A state-funded program for dislocated worker training.
[c] As administered by the Community and Technical College system.
[d] In $2005/2006.

outcomes except for the employment rate are conditional on non-zero values. For the study 3 results, the employment rates are differences in means and the quarterly earnings results are differences in non-zero medians between the program participants and matched comparison groups. The wage rate and earnings impacts are in 2005$. Note that these results include all participants—those individuals who completed their education or training and those who left without completing.

In examining the first column of data, one can easily discern that most of the programs listed in this table have statistically significant positive net impacts on short-term (3 or 4 quarters after exit) employment rates. The levels of the impacts are generally in the five to ten percentage point range. These education and training programs are generally successful at getting participants employed. The farthest right column of results shows the net impacts on quarterly earnings (for individuals with earnings). Whereas the estimates are generally positive, there is more variability in the levels and statistical significance of the earnings impacts than for employment. For example, Federal job training programs for youth and adult basic education have earnings impacts that are essentially zero, despite reasonably robust employment rate impacts. On the other hand, three programs—Community and Technical College job preparation, apprenticeships, and blind and visually impaired services have earnings outcomes that are substantially larger than the earnings impacts for the other programs in the table.

Of course, the reason that the earnings impacts are more variable than the employment impacts is that they are influenced by changes in wage rates and hours worked in addition to employment. We generally hypothesize that education programs, for example, enhance participants' human capital and productivity, which should show up in increased wage rates.

The community college job prep students, individuals who engaged in apprenticeships, students in private career schools, vocational rehabilitation clients, and individuals served by the program for blind and visually impaired individuals all show substantial wage rate gains in addition to employment rate increases. Dislocated worker programs, federal job training for youth, and adult education programs all have modest or even negative impacts on age rates or hours worked that considerably dampen positive employment impacts.

Table 4 displays the results for longer-term outcomes (defined as either 8 – 11 or 9–12 quarters after exit). These results reflect the extent to which the short-term impacts are retained. The results are not substantially different from those in table 3 for the programs that are shown in both tables. This suggests that for the most part, the programs' outcomes do not depreciate during the first few years after exit. All of the programs result in a statistically significant positive employment net impact, and all of them save federal job training for youth and adult basic education have statistically significant and positive earnings impacts. Again, the education programs with the exception of adult basic education have large net increases in wage rates.

## RATES OF RETURN

In addition to the net impact analyses, we conducted benefit-cost analyses for the workforce development programs in the two Washington studies. The benefits that were calculated included the following:

- Increased lifetime earnings (discounted)
- Fringe benefits associated with those earnings
- Taxes on earnings (negative benefit to participants; benefit to society)
- Reductions in UI benefits (negative benefit to participants; benefit to society)
- Reductions in TANF benefits (negative benefit to participants; benefit to society)

**Table 4**

**Long-Term Net Impact Estimates**

| Program | Study | Outcome: Employment Rate | Quarterly Hours | Wage Rate[c] | Quarterly Earnings[c] |
|---|---|---|---|---|---|
| Federal Job Training (Adults) | | | | | |
| JTPA II-A | 1 | 0.074*** | 23.9*** | $0.68** | $645*** |
| WIA I-B | 2 | 0.066*** | 35.9*** | $0.67** | $455*** |
| Federal Job Training (Youth) | | | | | |
| JTPA II-C | 1 | 0.053** | 2.3 | −$0.71 | −$85 |
| WIA I-B Youth | 2 | 0.103*** | 31.1*** | $0.77*** | $325*** |
| Dislocated Workers | | | | | |
| JTPA III | 1 | 0.073*** | 26.6*** | −$0.10 | $554*** |
| WIA I-B | 2 | 0.064*** | 48.8*** | $0.97*** | $771*** |
| Worker Retraining[a] | 1 | 0.063*** | 35.1*** | −$0.53 | $503*** |
| Worker Retraining[a] | 2 | 0.046*** | 29.8*** | $0.18 | $306*** |
| Education | | | | | |
| Secondary CTE | 1 | 0.057*** | 27.1*** | $0.60*** | $536*** |
| Secondary CTE | 2 | 0.054*** | 35.5*** | $0.67*** | $426*** |
| Comm. College Job Prep | 1 | 0.070*** | 54.9*** | $2.02*** | $1,409*** |
| Comm. College Job Prep | 2 | 0.067*** | 39.7*** | $2.11*** | $1,034*** |
| Private Career Schools | 2 | 0.043*** | 21.0*** | $1.06*** | $351*** |
| Adult Basic Ed.[b] | 1 | 0.016* | −4.9 | −$0.26* | −$53 |
| Adult Basic Ed.[b] | 2 | 0.059*** | 18.5*** | −$0.02 | −$27 |
| Apprenticeships | 1 | 0.053*** | 11.6* | $4.42*** | $2,269*** |
| | 2 | 0.068*** | 20.3*** | $5.73*** | $2,340*** |
| Disability Services | | | | | |
| Vocational Rehabilitation | 2 | 0.110*** | 44.8*** | $1.38*** | $699*** |
| Blind and Visually Impaired | 2 | 0.203*** | 78.4*** | $5.73*** | $1,531*** |

**NOTES:** Study 1 is Hollenbeck and Huang 2003 (Washington State); Study 2 is Hollenbeck and Huang 2006 (Washington State).

*** represents statistical significance at the 0.01 level; ** represents statistical significance at the 0.05 level; * represents statistical significance at the 0.10 level.

[a] A state-funded program for dislocated worker training.

[b] As administered by the Community and Technical College system.

[c] In $2005/2006.

- Reductions in Food Stamp benefits (negative benefit to participants; benefit to society)
- Reductions in Medicaid benefits (negative benefit to participants; benefit to society)

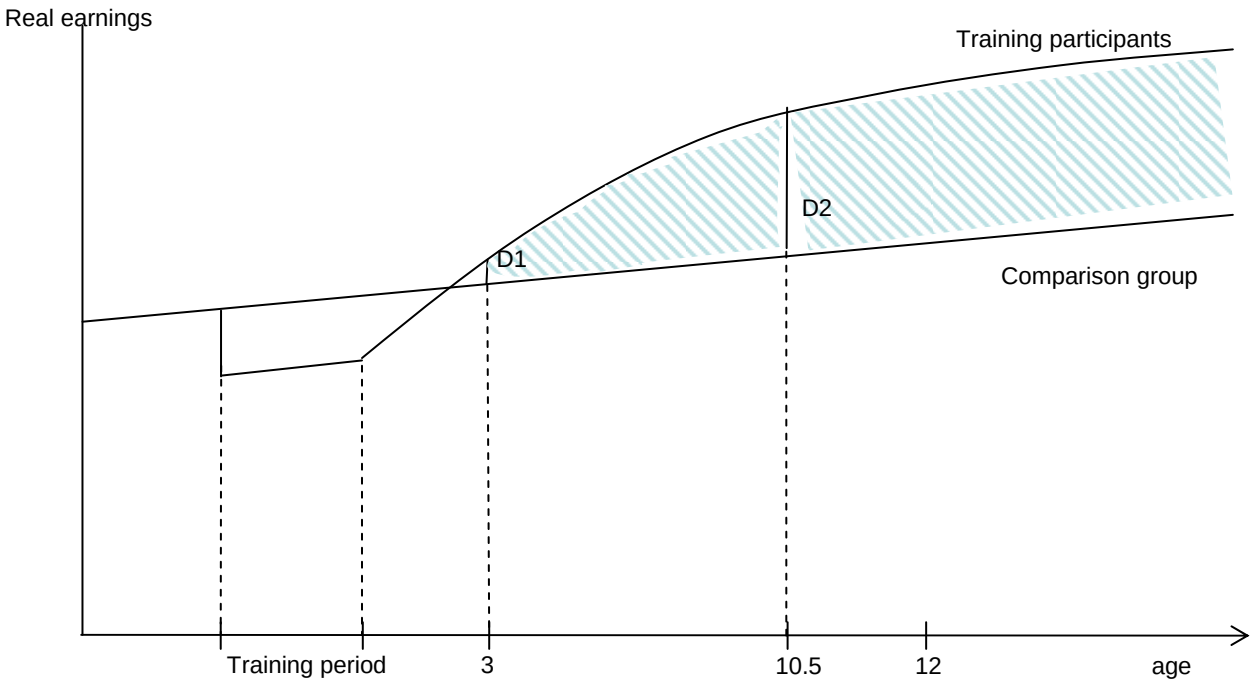
The costs included the following:

- Foregone earnings (reduced earnings during the period of training)
- Tuition payments
- Program costs

Most of these costs and benefits were derived from the net impact estimates.

**Earnings.** The approach that was used in the studies was to project benefits and costs for the "average" participant. Figure 2 shows the earnings profiles for the average individual in the treatment group and in the comparison group. The hypothesis used to construct these profiles is that encountering a workforce development program enhances an individual's skills and productivity (thus increasing wage rates) and increases the likelihood of employment. Thus, after

**Figure 2 Typical Earnings Profiles of a Training Participant and Comparison Group Member**



the training period, the treatment earnings profile is above the comparison earnings profile (both hourly wage and employment net impacts are positive.) During the training period, the treatment earnings will be below the comparison earnings, on average. These are the foregone costs of training in the form of wages that are given up by the participant while he or she is receiving training.

The theoretical lifetime earnings benefit would be the shaded area in the graph. The average comparison group member's real earnings grow at some fairly constant rate (increase in productivity), and the average treatment group member's earnings eventually become higher after training and likely grow faster as they accumulate additional human capital in the form of work experience.

The problem that needed to be solved was how to estimate the shaded area. The two lines D1 and D2 represent the difference in average earnings at three quarters after exiting from the training program and at 10.5 quarters after exit. These are essentially the short-term and longer-term net impact estimates. (Note that 10.5 is the midpoint of quarters 9–12). Because the profiles represent the *average* individual, we use the *unconditional* net earnings impacts to calculate these benefits. (They automatically control for employment, hourly wage, and hours worked impacts.)

What is unknown (and unknowable) is the shape of the earnings profiles into the future after the D2 point. The profiles could continue to move apart from each other if the training participants continue to be more and more productive relative to the comparison group member, or the profiles eventually may converge over time if the training effect depreciates. Alternatively, the profiles may become parallel to reflect a scenario in which the training participants gain a permanent advantage, but then their productivity growth eventually matches

the comparison group members. Since the earnings benefits are received by the participants in future periods, they need to be discounted. We used a 3 percent real discount rate.

In what this paper is referring to as study 1 (Hollenbeck and Huang 2003), the empirical strategy that we followed was to use the short-term and longer-term net impact estimates for unconditional earnings from the 2001/2002 data to "fit" a log earnings function. That is, we assumed a "smooth" curve between the three quarters and 10.5 quarters points after exit, and then used alternative assumptions to extrapolate curve's depreciation over time from the average age at program exit until age 65.

In the second study, we estimated regression-adjusted net impacts for all of the outcomes for periods three through twelve after exit for the 2001/2002 cohort and for periods two through four for the 2003/2004 cohort. For two of the programs, the longer-term net impact estimate for earnings exceeded the short term, and the intervening estimates grew reasonably smoothly, so we used a log-earnings curve extrapolation as we did in the prior study. These two programs were WIA Title I-B youth programs and secondary career and technical education. For adult basic education, the longer-term earnings impacts were not significantly different from zero, so we assumed no earnings increase for the average participant in this program. For three of the programs, the 10 quarters of data cycled up and down more or less randomly. In these cases, we used a constant net impact that was equal to the mean of the impacts for quarters +3 to +12. These three programs were WIA Title I-B dislocated worker programs, Community and Technical College worker retraining, and apprenticeships. Finally for all of the other programs, we assumed a constant rate of exponential decay between quarters +3 and +12.

**Fringe benefits.** With additional earnings, workers will also accrue additional fringe benefits in the form of paid leave, paid insurances, retirement/savings plan contributions, and

other non-cash benefits. Two sources of data provided estimates of the ratio of fringe benefits (defined as paid leave plus paid insurances plus retirement plan contributions plus other) to gross wages and salaries (including supplemental pay such as overtime). The U.S. Department of Labor Bureau of Labor Statistics (2002), reports this ratio to be 23.3 percent for "All U.S." and 20.4 percent for the "West Census Region." The U.S. Chamber of Commerce (2001) reports a ratio of 24.3 percent for the Pacific region. Under the assumption that workforce development program participants are less likely to get fringe benefit coverage than the average worker, and to be conservative in our benefit estimation, we used the assumption that this ratio would be 20 percent (applied to the discounted annual earnings increments).

**Tax payments.** Higher earnings will lead to payment of increased payroll, sales/excise, and federal income taxes.[5] The increased taxes are a cost to participants and a benefit to the public. We used average (marginal) tax rates for each of the three types of taxes and applied these rates to the annual earnings changes. The current rate of 7.65 percent was used to estimate the future payroll tax liabilities. This requires three assumptions: this rate will not increase in future years, all participants will be employed in covered employment (not self-employed), and that none of the participants will exceed the maximum earnings levels against which this payroll tax is applied.

The assumption that the rate will remain fixed at its current rate seemed like a reasonable compromise since it is likely that the rate will continue to increase somewhat over time as it has in the past, but it is also likely that some participants will work in non-covered employment (such as agriculture) and that a few participants will exceed the taxable earnings maximums. Thus we may be underestimating future tax rates, but overestimating the taxable base.

[5]Washington does not have state income taxes.

Note that, under FICA, employers also pay additional payroll taxes. However, these taxes do not need to be factored into the benefit-cost analysis since they are a transfer from employers to the public. Similarly, Vroman (1999) shows that employers bear, on average, a payroll tax rate of 2.13 percent for unemployment insurance taxes. But, these also represent a transfer from employers to the public that do not affect participants.

We used a methodology similar to the payroll tax estimation to calculate sales/excise tax liabilities, but in this case used a rate of 7.5 percent for all of the programs in the first study, and 4.6 percent for all of the programs except for dislocated workers, community and technical college worker retraining, and apprenticeships in the second study. For the latter programs, in which recipients had higher incomes, we used a rate or 8.35 percent. These rates were derived from tables produced by a tax simulation model developed and documented by a State of Washington analyst, Rick Peterson.[6]

For federal income taxes, we again used a simple average (marginal) tax rate, which is applied to the change in earnings. For the first study we used a rate of 0.10, which was derived from Table 474 of the *2001 U.S. Statistical Abstract*. For the second study, we used the U.S. Department of Commerce, *2006 U.S. Statistical Abstract*, Table 474, p. 326. The average of the marginal tax rates for AGI classes less than $17,000 is 0.0466, and the average of the marginal tax rates for AGIs between $17,000 and $40,000 is 0.1002. Based on these two numbers, we decided to use a (marginal) tax rate of 0.05 for all the programs except for dislocated workers, community and technical college worker retraining, and apprenticeship. For the latter three programs, we use 0.10.

[6]The first study used an unpublished document titled, *Washington Excise Tax Simulation Model, 2002*, and the second study used an online document accessed in March 2006 at http://www1.leg.wa.gov/documents/opr/2005/Tax%20Alternatives%20Model %2020055%ver2.xls.

**Unemployment compensation.** Unemployment compensation benefits in the future may increase for participants if programs increase employment (and therefore the probability of receiving UI) or increase earnings (and therefore benefits) or they may decrease if programs decrease the likelihood of unemployment or decrease duration of unemployment spells. Increased UI benefits in the future would be a discounted benefit to participants and cost to the public. We used a similar empirical strategy as we did for lifetime earnings to interpolate and extrapolate these benefits. In particular, we estimated the unconditional UI benefit net impacts for the first 12 quarters after exit and used these estimates as the average impact for the program in those quarters. Then we used the estimate for the 12th quarter after exit to extrapolate for 28 more quarters for all of the programs except federal job training youth programs and secondary CTE programs, for which we extrapolated an additional 40 quarters. In other words, we assumed that the UI benefit gain or loss would dampen to 0 after 10 years for most of the programs and after 20 years for the two youth programs.

**Income-conditioned transfers.** The maintained hypothesis was that participation in the workforce development programs would decrease the probability of receiving TANF and Food Stamps, and the probability of enrolling in Medicaid. In addition, increased earnings may have resulted in reductions in benefit levels for TANF and Food Stamps. Finally, if individuals no longer receive TANF or Food Stamps, they would not receive any support services such as child care or other referrals.

For TANF/Food Stamps, we followed the same empirical strategy as we did for unemployment compensation. We estimated net impacts for unconditional TANF benefits and Food Stamp benefits for the twelve quarters after program exit cohort and extrapolated beyond that period using the estimate from quarter +12. We again assumed that on average, the program

participants may receive these benefits (or lose these benefits) for up to 40 quarters (or 80 quarters for the youth programs) even though TANF is time limited to 20 quarters. The reason for going beyond 20 quarters is that these are averages for the entire program group, and the dynamics of recipiency will be assumed to continue for up to 10 years.

The typical pattern for the workforce development programs is that in the short term, TANF benefits are decreased for participants who exit because, for the most part, employment rates increase—at least, some individuals leave the rolls. However, as time progresses, some workers begin to lose employment, or become single and have dependent children, and the group's TANF net impact benefits become positive, although of relatively small magnitude. Support costs in TANF were estimated by WTECB personnel to be 124.26 percent of each case's cash benefits in the first study (131.28 percent in the second study.) Thus the quarterly increases or decreases in TANF benefits from the interpolation/ extrapolation functions were inflated by these percentages to reflect total programmatic costs per participant. The increases (or decreases) in TANF benefits for the average participant were exactly offset by decreases (or increases) in public benefits.

We followed a similar empirical strategy for Food Stamps as we did for TANF. We estimated net impacts for unconditional benefits for the twelve quarters after program exit and extrapolated beyond that period using the estimate from quarter +12. We again assumed that on average, the program participants may receive these benefits (or lose these benefits) for up to 40 quarters (or 80 quarters for the youth programs).

Our data did not have benefit/usage information for Medicaid, so we estimated net impacts of actually being enrolled in Medicaid. The working hypothesis was that training participants will tend to decrease their enrollment rates as they become better attached to the

labor force over time and lose eligibility. The average state share of Medicaid expenditures per enrollee was estimated to be $195 per month (in 2001$) for the first study and $145.11 per month (in 2000$) for the second.[7] Each enrolled individual was assumed to average 2.15 persons per case. So the decrease (increase) in per participant Medicaid expenditures per quarter was estimated to be the net impact estimate for Medicaid enrollment times $595 (three months at $195 per month) for the first study times 2.15 or $435.33 times 2.15 in the second study. This was a benefit to the participant and a cost to the public. To interpolate/extrapolate the net impact of a program on Medicaid eligibility, we either averaged or fit a linear equation to the short term and longer-term estimate.

**Costs.** Two types of costs were estimated for each of the programs. The first was foregone earnings, which would be reduced earnings while the participants were actually engaged in the training programs. The second type of cost was the actual direct costs of the training. In some cases this involved tuition or fee payments by the participants, and in all cases it involved state subsidies for delivering the training. The data sources for these types of costs are considered in turn.

Foregone earnings represent the difference between what workforce development program participants would have earned if they had not participated in a program (which is unobservable) and what they earned while they did participate. The natural estimate for the former is the earnings of the matched comparison group members during the length of training. Specifically, we used (7) to estimate mechanistically the foregone earnings. Note that we did not discount foregone earnings, but did calculate them in real $.

[7]Personal communication from the Washington Training and Education Coordinating Board staff citing Laura Piliairis of the Washington State Medical Assistance Administration as the source of these benefit data.

(7) $$Foregone_i = \left[ 0.5 \times \left( \hat{E}_{-1_i} + \overline{E}_{-1_i} \right) - \overline{E}_{0_i} \right] \times d_i \quad ,$$

where, $\overline{E}_{-1}, \overline{E}_0$ = avg. quarterly earnings (uncond.) for treatment group in quarter –1 and during training period, respectively.

$\hat{E}_1$ = avg. quarterly earnings in 1st post-exit period for matched comparison group

$d$ = avg. training duration

$i$ = indexes program

For the most part, the program costs were supplied to us by the State of Washington. The JTPA and WIA costs were calculated from administrative microdata on days in the program and cost data from the program[8]. Staff from the State Board for Community and Technical Colleges (SBCTC) supplied the cost data for the ABE, Job Preparation, and Worker Retraining programs. In particular, these data included the state support and tuition/fees for a full-time resident student.

Per state staff's suggestion, we assumed that job prep students averaged 1.9 years; worker retraining participants averaged 1.3 years; and ABE participants average 1.0 years of full-time equivalent course taking. We furthermore assumed that ABE students did not pay tuition. Note that we did not include any other educational expenses such as books or transportation; nor are we factoring in any sort of financial aid. In the case of ABE, there are no tuition or supply costs to participants by assumption.

Because of the tremendous variation in tuitions and fees at private career schools, we did not include private costs in the cost-benefit analysis. By assumption, the public cost is $0.

[8] Personal communication from C. Wolfhagen, January 19, 2006.

The data on tuition and state subsidies from SBCTC were used to calculate private and public apprenticeship costs in the second study. The assumptions that were used were that apprentices are "charged" one-half of the full-time tuition as their share of costs, that they take 144 hours of classroom instruction per year (= 0.16 fte), and that they take formal classroom instruction for 4.0 years. Using these assumptions, we estimated an average public support of apprentices = $2,316 and the average private tuition cost = $593. Again, the private costs do not include books, tools, equipment, or transportation.

The Office of the Superintendent of Public Instruction provided a state and federal cost per FTE student of $870 (in $2001) for the first study and $704 (in $2000) for the second study. We assumed that there were no private costs to high school students.

The second study included programs and the Department of Vocational Rehabilitation (DVR) and the Division of Services to the Blind (DSB). These agencies provided cost data.. In the case of DVR programs, we were given a fixed cost per participant (for management and other supports) and a monthly cost. In nominal terms, these were $2,487 for the fixed cost and $183 for the monthly cost. Furthermore, we were given 26.45 as the average case duration in months. These costs worked out to a public support for each DVR client of $7,381.

For the DSB clients, we were given nominal costs per exiter of $22,117 for the relevant cohorts of exiters. Deflating these to 2000$ gave us a public cost for the average client of $21,142.

Table 5 displays the estimated benefits and costs for the programs analyzed in the two Washington studies for the first 10 quarters after program exit. The table entries represent financial gains (positive benefits or negative costs) or costs (negative benefits or positive costs) for the average participant. The costs and benefits are shown from three perspectives: for the

individual, for the public (taxpayers), and for society as a whole. The latter is the sum of the first two. The dollar figures are in constant $2005/2006 and have been discounted at 3 percent.

Table 5 shows that the discounted (net) benefits to the participants over the first 10 quarters after exit are generally in the range of $2,500 to $5,000. Participants in community college Job Prep, apprenticeships, and disability programs fared better, and federal job training for youth and adult basic education did worse. The costs to participants range considerably with large costs in the form of foregone earnings for dislocated workers and very large negative costs for apprentices (they make far more during their training period than the comparison group.) The returns on investment for participants in this time period are generally either incalculable or negative.

For the public, benefits are generally in the $1,000 to $3,000 range and are typically less than the public costs. For almost none of the programs is the rate of return for the public positive in the first 10 quarters. This suggests that these programs do not fully payoff within the first 10 quarters after a participant exits.

Taxes and income-conditioned transfers are transfers between participants and the public, the benefits to society are simply the earnings and fringe benefits of participants. For the most part they are positive, and in some cases, fairly substantial. However, in the first ten quarters, they do not tend to offset the sum of the costs to participants and to the public taxpayers.

## Table 5

**Discounted Benefits and Costs and Rates of Return for Washington's Education and Training System over First 2.5 Years after Exit, by Program**

| Program | Study | Private | | | Public | | | Social | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Benefits | Costs | r.o.i. | Benefits | Costs | r.o.i. | Benefits | Costs | r.o.i. |
| Federal Job Training (Adults) | | | | | | | | | | |
| JTPA II-A | 1 | $1,106 | $ 403 | 8.24% | $3,989 | $3,791 | 1.36% | $5,095 | $4,194 | 3.07% |
| WIA I-B | 2 | 4,173 | −1,111 | — | 3,113 | 5,744 | −15.36% | 7,286 | 4,633 | 9.94% |
| Federal Job Training (Youth) | | | | | | | | | | |
| JTPA II-C | 1 | −3,646 | 384 | — | 1,864 | 2,605 | −4.69% | −1,782 | 2,989 | — |
| WIA I-B Youth | 2 | 3,313 | 0 | — | −1,151 | 6,617 | — | 2,163 | 6,617 | −15.96% |
| Dislocated Workers | | | | | | | | | | |
| JTPA III | 1 | 4,944 | 13,640 | −12.49% | 882 | 2,885 | −12.29% | 5,826 | 16,525 | −12.45% |
| WIA I-B | 2 | 4,258 | 10,746 | −10.72% | 5,770 | 7,081 | −5.59% | 10,028 | 17,827 | −9.38% |
| Worker Retraining[a] | 1 | 2,352 | 18,631 | — | 1,375 | 5,256 | −16.70% | 3,727 | 23,887 | −20.17% |
| Worker Retraining[a] | 2 | 2,490 | 8,952 | −15.68% | 1,773 | 5,421 | −2.44% | 4,263 | 14,373 | −17.74% |
| Education | | | | | | | | | | |
| Secondary CTE | 1 | 3,069 | 432 | 33.85 | 1,019 | 974 | 0.66% | 4,088 | 1,406 | 17.32% |
| Secondary CTE | 2 | 3,058 | −32 | — | 749 | 811 | −1.38% | 3,807 | 779 | 42.34% |
| Comm. College Job Prep | 1 | 3,954 | 5,034 | −2.67% | 1,804 | 7,749 | −16.87% | 5,758 | 12,783 | −8.91% |
| Comm. College Job Prep | 2 | 10,463 | 6,474 | 8.68% | 3,967 | 7,523 | −15.38% | 14,430 | 14,397 | −0.04% |
| Private Career Schools | 2 | 2,616 | 308 | —[c] | 2,356 | 0 | —[c] | 4,972 | 308 | —[c] |
| Adult Basic Ed.[b] | 1 | 2,452 | 311 | ++ | −1,565 | 1,101 | — | 887 | 1,412 | −7.75% |
| Adult Basic Ed.[b] | 2 | 771 | −146 | — | −771 | 2,570 | — | 0 | 2,424 | — |
| Apprenticeships | 2 | 24,139 | −24,465 | — | 5,353 | 2,668 | 20.60% | 29,492 | −21,797 | — |
| Disability Services | | | | | | | | | | |
| Vocational Rehabilitation | 2 | 7,789 | −643 | — | 2,073 | 8,504 | −21.65% | 9,862 | 7,861 | 4.50% |
| Blind and Visually Impaired | 2 | 19,516 | 1,059 | ++ | 4,592 | 24,358 | — | 24,108 | 25,417 | −2.95% |

**NOTES:** Study 1 is Hollenbeck and Huang 2003 (Washington State); Study 2 is Hollenbeck and Huang 2006 (Washington State). Table entries are for average participant. Benefits include earnings, fringe benefits, and income-related transfers payments. Costs include tuition and fees (if any), foregone earnings, and public program costs per participant. $ figures are in real $2005/2006. — means that r.o.i. could not be calculated because of 0 or negative benefits or costs. ++ means r.o.i. is implausibly high.

[a] A state-funded program for dislocated worker training.

[b] As administered by the Community and Technical College system.

[c] No data collected on tuition or fees, so costs are partial. We therefore did not calculate r.o.i.

Table 6 tells a different, more sanguine story. This table provides the benefits, costs, and return on investments of the average individual served by a program through their working lifetime. Here we extrapolated benefits from the average age of exiters until age 65. For individuals, the discounted (net) lifetime benefits tend to be substantial. With the exception of adult basic education, these benefits are at least $20,000. The costs are generally minimal except for the foregone earnings for dislocated workers, so the return on investment is positive. The benefits accruing to the public over the average worker's lifetime is dominated by tax payments on increased earnings. Given that those earnings tend to be quite substantial, it is not surprising that the public benefits far exceed the public costs, and there are fairly handsome returns to the public for virtually all programs. For society, the story is quite similar. The benefits far exceed the costs, and the returns are therefore quite handsome.

## SUMMARY

The contribution of this paper has been to extend in two directions the net impact estimates that have been generated through quasi-experimental methods with administrative data such as in the Hollenbeck et al. (2004) paper. The net earnings impacts were decomposed into employment, hours of work, and wage rate impacts. Secondly, the earnings impacts were combined with estimates of impacts on fringe benefits, tax payments, and income-conditioned transfers to conduct a benefit cost analysis of workforce programs.

The policy implications of this work are several in number. First, the studies add to the inventory of work that demonstrates that useful evaluations of workforce development education and training programs can be done with administrative data. Second, the decomposition of net

earnings impacts into employment, hours, and wage rates adds rich understanding to the variation in these impacts across programs. The rate of return analyses demonstrate that the public (i.e., taxpayers) and society as a whole can benefit financially from education and training investments, although the payoffs generally take more than 10 quarters to offset the costs.

Finally, the results for individuals programs are illuminating. The estimates presented here suggest that apprenticeships, community college job preparatory training, and vocational rehabilitation programs have quite substantial financial payoffs for participants. On the other hand, adult basic education programs tend not to provide much of an economic return to participants or the public. The Workforce Investment Act (WIA) services for adults seem to have a significant positive impact on employment, wage rates, and earnings. Not surprisingly, the analyses point out the large foregone earnings of dislocated workers that dampen their financial payoff to training. Policy makers may wish to consider stronger support mechanisms for these workers such as stipends during training. The analyses presented here also buttress strongly the research that has shown significant economic returns to career and technical education in the high schools.

## Table 6

**Discounted Benefits and Costs and Rates of Return for Washington's Education and Training System over Working Lifetime, by Program**

| Program | Study | Private | | | Public | | | Social | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Benefits | Costs | r.o.i. | Benefits | Costs | r.o.i. | Benefits | Costs | r.o.i. |
| Federal Job Training (Adults) | | | | | | | | | | |
| JTPA II-A | 1 | $62,744 | $ 403 | 20.52% | $25,092 | $3,791 | 9.26% | $87,836 | $4,194 | 13.23% |
| WIA I-B | 2 | 38,928 | −1,111 | — | 6,241 | 5,744 | 0.21% | 45,170 | 4,633 | 15.14% |
| Federal Job Training (Youth) | | | | | | | | | | |
| JTPA II-C | 1 | 30,235 | 384 | 3.08% | 6,770 | 2,605 | 6.08% | 37,005 | 2,989 | 3.61% |
| WIA I-B Youth | 2 | 29,002 | 0 | — | 8,282 | 6,617 | 0.07% | 37,284 | 6,617 | 4.55% |
| Dislocated Workers | | | | | | | | | | |
| JTPA III | 1 | 81,327 | 13,640 | 5.19% | 25,719 | 2,885 | 6.81% | 107,046 | 16,525 | 5.53% |
| WIA I-B | 2 | 49,201 | 10,746 | 5.00% | 18,440 | 7,081 | 5.15% | 67,641 | 17,827 | 5.04% |
| Worker Retraining[a] | 1 | 70,012 | 18,631 | 2.86% | 22,803 | 5,256 | 3.93% | 92,815 | 23,887 | 3.08% |
| Worker Retraining[a] | 2 | 23,938 | 8,952 | 2.82% | 7,049 | 5,421 | 0.60% | 30,987 | 14,373 | 2.14% |
| Education | | | | | | | | | | |
| Secondary CTE | 1 | 70,505 | 432 | 37.05% | 13,389 | 974 | 10.39% | 83,894 | 1,406 | 23.04% |
| Secondary CTE | 2 | 43,491 | −32 | — | 8,414 | 811 | 9.29% | 51,905 | 779 | 43.97% |
| Comm. College Job Prep | 1 | 103,926 | 5,034 | 10.44% | 31,235 | 7,748 | 3.55% | 135,161 | 12,783 | 7.08% |
| Comm. College Job Prep | 2 | 95,228 | 6,474 | 15.10% | 14,873 | 7,523 | 2.20% | 110,101 | 14,397 | 9.19% |
| Private Career Schools | 2 | 35,089 | 308 | —[c] | 1,279 | 0 | —[c] | 36,368 | 308 | —[c] |
| Adult Basic Ed.[b] | 1 | 4,944 | 311 | ++ | 3,020 | 1,101 | 1.34% | 7,964 | 1,412 | 5.75% |
| Adult Basic Ed.[b] | 2 | 5,558 | −146 | — | −5,558 | 2,570 | — | 0 | 2,424 | — |
| Apprenticeships | 2 | 197,896 | −24,465 | — | 49,288 | 2,668 | 24.25% | 247,184 | −21,797 | — |
| Disability Services | | | | | | | | | | |
| Vocational Rehabilitation | 2 | 56,560 | −643 | — | 11,302 | 8,504 | 0.75% | 67,862 | 7,861 | 11.99% |
| Blind and Visually Impaired | 2 | 100,799 | 1,059 | ++ | 20,094 | 24,358 | −0.55% | 120,893 | 25,417 | 7.39% |

**NOTES: :** Study 1 is Hollenbeck and Huang 2003 (Washington State); Study 2 is Hollenbeck and Huang 2006 (Washington State). Table entries are for average participant. Benefits include earnings, fringe benefits, and income-related transfers payments. Costs include tuition and fees (if any), foregone earnings, and public program costs per participant. $ figures are in real $2005/2006. – means that r.o.i. could not be calculated because of 0 or negative benefits or costs. ++ means r.o.i. is implausibly high.

[a] A state-funded program for dislocated worker training.

[b] As administered by the Community and Technical College system.

[c] No data collected on tuition or fees, so costs are partial. We therefore did not calculate r.o.i.

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